

CELL CYCLE & CELL DIV SUMMARY SHEET:-

- Cell division is of two types → mitosis & meiosis.
- The DNA in prokaryotes is one double stranded circular DNA attached to the inside of cell membrane.
- Eukaryotes store genetic information in chromosome.

Mitosis

Mitosis - (Flemming coined the term).

- Mitosis has two stages -
  - Interphase (growth phase)
  - Karyokinesis & Cytokinesis (div. phase)

a) Interphase - (Occupies 95% of cell cycle)

↳ cell is most active metabolically in interphase.

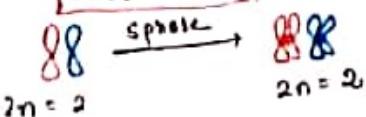
It is divided into three parts:

i) G<sub>1</sub> phase - All raw material for growth is synthesized (12 hrs)
 

- no of organelles increases
- Proteins such as DNA polymerases, non-histone protein, histone proteins are synthesized.

ii) S-phase - • Replication of centrioles occurs (6-8 hrs)
 

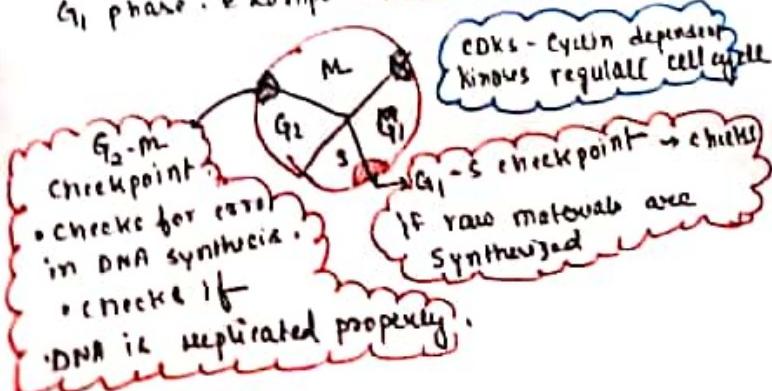
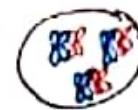
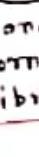
- DNA content doubles but chromosomes no. remains same.

chromosomes

iii) G<sub>2</sub> phase - (3-4 hours)
 

- Massive production of tubulin occurs which gives rise to spindle apparatus.
- Replication of centrioles completed.
- Cell size increases.
- However, maximum cell growth occurs in G<sub>1</sub>.

• Many cells are metabolically more active but don't divide and enter G<sub>0</sub> phase after G<sub>1</sub> phase. Examples: heart cells, nervous tissue.

② Mitosis -Prophase:Metaphase:Anaphase:Telophase:

Note: N/C ↑ (Nuclear cytoplasmic ratio ↑) / cell division ↑, activity ↑ S/A/V ↑ (Surface area/volume ratio ↑), cell division ↑, activity ↑).

Cytokinesis: In animals forms due to
 

- furrow, at the plasma membrane, centripetal.
- In animals due to a cell plate formed by Golgi vesicles, ER, remnants of spindle fibres which give rise to cell plate → centrifugal.

Modifications of Mitosis

- a) Uncontrolled mitosis → unlimited mitosis leads to formation of tumour
  - Occurs due to cellular oncogenes.

b) Parameiosis: Mitosis occurs with all the usual steps of karyokinesis but nuclear membrane does not disintegrate.

- Found in amoeba

c) Free nuclear division: - karyokinesis not followed by cytokinesis. Example: endoparasitic fungi of phycomycete group.

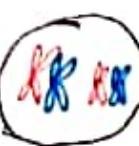
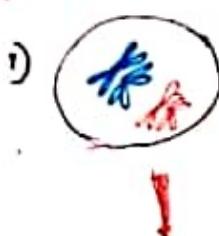
Meiosis → Meiosis I → Meiosis II

- Refers to as reductional division.
- chromosome number halves.
- Name proposed by Farman & Moore.
- Found in gamete forming cells.

① Meiosis I → Prophase I:-

1. Leptotene: condensation.
2. Zygotene: pairing of homologous chromosome
3. Diplotene: chiasmata clearly visible
4. Diakinesis: separation of chiasmata
5. Pachytene: crossing over occurs.

① Leptotene: - chromatins network visible as thick threads.



2) Zygotene:

- chromosomes which are homologous pair forming bivalent or tetrad.
- synaptonemal complex



formed.

synaptonemal complex → ribonucleoprotein complex made mainly of protein ubiquitous. Synaptonemal complex was first observed in crayfish by Mosh.

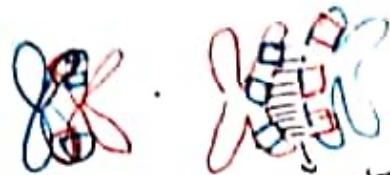
3) Pachytene: Recombination nodules occur in the synaptonemal complex which lead to cross over. non-sister chromatids



bridge like synaptonemal complex

enzymes recombined.

• Enzyme recombinase leads to recombination of parts of chromosomes (genes) between non-sister chromatids to be exchanged.



synaptonemal complex.

• Pachytene stage involves crossing over or exchange of corresponding parts of chromosome between non-sister chromatids.

• It is the longest stage of prophase I.

Diplotene: Marked by the dissolution of synaptonemal complex.

- Terminalization starts
- chiasmata appears clearly.

Diakinesis: • Terminalization of chiasmata ends.

Anaphase I: Metaphase plate of homologous chromosomes form

Anaphase I: - homologous chromosome move in opposite pole.

Telophase I: - Followed by meiosis II. Transition phase between meiosis I & II.

② Meiosis II: - Just like mitosis. Equational div.

③ Amitosis → Observed by Flemming.

1. Simplest form of cell div.
2. Nuclear material divides into two
3. Cell wall formed
4. Two cells are formed

